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# INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

CHICAGO 16, ILLINOIS

# GAS ABSTRACTS

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# 1. GAS INDUSTRY

## Court Decisions 1950

Parker, L. T. VARIETY OF GAS LEGAL PROBLEMS INVOLVED IN 1950 HIGHER COURT DECISIONS. *Am. Gas. J.* **174**, 22, 23, 46 (1951) March.

Several decisions are of interest to utility companies which believe they are exempt from some federal controls because their operations are entirely intrastate. In National Labor Relations Board v. Mid Gas Company it was ruled that a utility is within the jurisdiction of the NLRB if it supplies as little as five per cent of the gas needed by a user whose business "affects interstate commerce." In Long Island Lighting Co. v. Securities & Exchange Commission it was decided SEC had jurisdiction over the Long Island company and its subsidiaries because they sold a portion of their stock to purchasers outside the state of New York. Other decisions noted: The action of the City of Pensacola in levying a tax on the sale of gas and pledging a portion of the revenue to pay for improving or paving streets, was upheld. A gas company is not liable for an explosion indirectly caused by a failure of its employee to lock an outside valve to prevent its being turned on before gas lines inside a residence are approved. A higher court reversed a Tennessee jury's award of $5000, over $1250 per acre, in a condemnation suit for 3.97 acres of land assessed at $40 per acre.

A. E. Neumann

## FPC Regulation

Crosby, S. H. TWELVE YEARS UNDER THE NATURAL GAS ACT. PART II. *Public Utilities Fortnightly* **47**, 411-417 (1951) March 29.

A former FPC examiner reviews some of the more recent regulations.

J. D. Parent

Reviewer's comment: This has been written in popular language, and no effort has been made to critically discuss any case. Nothing is said in answer to the cry that controls are ever expanding beyond what was stated and implied in the original law, although it could have been discussed logically in this manuscript.

Ralph, H. D. PHILLIPS HEARINGS OPEN. *Oil Gas J.* **49**, 63 (1951) April 5.

The celebrated Phillips case has been reopened by the FPC to determine if the company is a natural gas company as defined by the FPC. The ultimate objective is to decrease the price of gas sold ultimately in Michigan and Wisconsin.

J. D. Parent

## Gas Prices

McCaslin, L. S., Jr. T.I.P.R.O. ACTION. *Oil Gas J.* **49**, 61 (1951) April 5.

The Texas Independent Producers & Royalty Owners Association refused to favor a statewide minimum wellhead price for natural gas, but did feel that price inequities throughout the state should be adjusted.

J. D. Parent

## Industry Growth

THE AMAZING GROWTH OF UNDERGROUND STORAGE. *Am. Gas Assoc. Monthly* **33**, 10-12, 42, 43 (1951) April.

A survey of a representative cross-section of gas companies throughout the country is presented. Answers are provided to the questions: amount of gas stored underground by the company; number of underground storage fields currently in operation, and their location with respect to the company's markets; approximate days of supply contained in these fields; plans for additional storage facilities; and methods of conditioning old wells for the receipt of storage gas.

J. J. Guyer

NATURAL GAS RESERVES AGAIN GAIN DESPITE RECORD PRODUCTION. *Gas Age* **107**, 11-13 (1951) March 29.

Natural gas reserves as of December 31, 1950 are quoted as 185.6 trillion cu ft. 1950 production was 6.89 trillion cu ft. Natural gas liquids reserves were 4,268 million bbls while 1950 production amounted to 227 million bbls.

J. D. Parent

## Latin American Gas

Livingstone Wallace, N. B. THE GAS INDUSTRY IN LATIN AMERICA. *Gas World* (British) **133**, 343 (1951) March 31.

Latin America, with 102 million population, is experiencing a rapid increase in the use of gas for commercial and domestic purposes. Nat-

ural gas now is supplied in Mexico, Argentina and Venezuela at the capital cities, and pipeline extension continues. Bottled LP-gas is used in Argentina, Columbia, Cuba, Mexico, Guatemala, Panama, Peru, El Salvador and Uruguay. Manufactured gas is produced in Chile (4.7 billion C.F./year) and Cuba (1.5 billion C.F./year). A wide market for appliances is indicated.

O. P. Brysch

## Pipeline Projects

Reed, P. NEW GAS LINE PLANNED. *Oil Gas J.* **49**, 166 (1951) March 29.

Gulf-Michigan Transmission Corp. has been formed to construct a 30-inch diameter line from Monroe, La. to Michigan City, Ind. Gas would be supplied by United Gas Pipe Line Co. and principal recipients would be LaClede Gas Co., Illinois Power Co. and various subsidiaries of American Natural Gas Co.

J. D. Parent

FPC APPROVES $240,645,085 GAS LINES FOR THREE COMPANIES. *Pipe Line News* **23**, 21-22 (1951) March.

Proposals involving the laying of 2321 miles of natural gas pipe line and installation of 159,430 compressor horsepower, at total estimated cost of $240,645,085, were approved February 26 by FPC. The projects are those of United Gas Pipe Line Co., Texas Eastern Transmission Co. and Algonquin Gas Transmission Co. They are designed to provide gas supply for the New England system to be constructed by Algonquin as well as to provide more gas for present customers of United Gas and Texas Eastern and for new customers to be added by these companies.

O. T. Bloomer

TENNESSEE GAS TO LAY 794 MILES LINE AND ADD COMPRESSORS. *Pipe Line News* **23**, 18-19 (1951) April.

491 miles of loop line and 303 miles of new line will be built in 1951. The extension across New York State to Pittsfield, Mass. is to join line to be laid by Northeastern Gas Transmission Co., which will serve New England.

J. D. Parent

"NO PIPE" *Oil Gas J.* **49**, 61-62 (1951) April 5. It is becoming increasingly difficult to get pipe. Fear is expressed that drilling goals will not be met and that gas to industrial consumers must be curtailed in some areas next winter.

J. D. Parent

## Research Methods

King, J. G. MODERN METHODS OF RESEARCH. *Gas World* (British) **133**, 250-255 (1951) March 10.

This somewhat general article considers research methods in many fields. The relations between pure and applied research are discussed and the importance of closer liaison is stressed. The application of scientific methods are shown in a discussion of sulfur removal from coal gas and in the problem of gaseous combustion at very high rates. The use of statistical analysis is commended and so-called "mass attack" on a problem is deprecated.

S. Katz

## Safety Campaign

Adams, W. H. GAS INDUSTRY CAMPAIGNS FOR SAFETY. *Public Utilities Fortnightly* **47**, 479-483 (1951) April 12.

The gas industry does not have an enviable accident record. It stands 34th on the list of all industries on a frequency basis with 17.92 disabling injuries per 1,000,000 man hours and 22nd on the list of all industries on a severity basis with .99 days lost per 1,000 man hours. The direct and hidden costs of these injuries is estimated to be $15,000,000 for the year 1949, about 2½% of the total pay roll. Mr. D. A. Hulcy, president of the AGA and chairman of !the AGA Accident Prevention Committee, has launched a safety drive aimed initially at top management. It is felt that until top management fully understands accident prevention it cannot successfully pass this information along to the operating divisions. The gas industry goal is the record of the Elyria district of the Ohio Fuel Gas Company which recently completed 4,026,884 man hours of work without a disabling accident.

W. G. Bair

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

LPG FOR STANDBY OR PEAK SHAVING. p. 74 PARTIAL TEXT OF WHOLESALE OIL PRICE ORDER. p. 77.

## 2. APPLIANCES

### Appliance Tax

Muhlbach, W. F. WHY APPLIANCE EXCISE TAX SHOULD BE REPEALED. *Gas Age* **107**, 31, 58-60 (1951) April 12.

This statement gives the arguments of the Institute of Cooking and Heating Appliances Manufacturers against the proposed excise tax of 25% of the manufacturer's selling price, and against the present 10% tax. Such a tax is in effect a tax on food and comfort, it is discriminatory, does not aid materials conservation, will not bring expected revenues because of pending cutbacks and sales reductions, will disrupt conditions in the appliance industries, will hamper correction of health and housing hazards, and cost to taxpayer will be pyramided. An Emergency Tax at low rates on all manufactured consumer goods is proposed, on a year-to-year basis to fit the needs of the increased defense budget.

O. P. Brysch

### Appliance Testing

Minchin, L. T. GAS APPLIANCE TESTING IN GERMANY. *Coke & Gas* (British) **13**, 102-105 (1951) March.

A brief discussion is given of the rebuilt testing laboratories of the Gaswarme Institut at Langenberg. This laboratory is one of three in Germany for testing of gas fired equipment, both industrial and domestic. Testing procedures are compared to those used in England, and a few research projects on heat transfer of gas flames are discussed.

D. L. Nicol

## 3. COMBUSTION AND INDUSTRIAL FURNACES

### Air Pollution

Barkley, J. F. AIR-POLLUTION PREVENTION IN THE UNITED STATES. *Mech. Eng.* **73**, 284-288 (1951) April.

This general review of air pollution brings out the fact that activities have been carried out in this field for almost a century in this country. While considerable progress has been made, we are much farther from a basic solution of air pollution problems than of similar problems in water, milk and food. Little thought is given to the fact that the human body takes in 3 to 5 times as much air as food, and perhaps 10 times the quantity of water.

W. E. Ball

### Combustion Research

Sarjant, R. J. THE MELCHETT LECTURE FOR 1950 "IGNIPOTENCE." *J. Inst. Fuel* (British) **24**, 2-10, 40 (1951) January.

The title, meaning the control of fire or the power of fire, denotes the broad field of this discussion of fuel efficiency and fuel research, based upon past and current studies at Sheffield University. Work on combustion and heat transfer has dealt with measurement of flame emissivity, total heat content of combustion gases, temperatures of gases and fuel beds and aerodynamical factors. Heat transmission from combustion gases in smoke tubes has been studied especially with respect to gas turbulence. Heat flow in furnaces has been studied mathematically by an electric-analog integrator. Coke combustion is dependent upon constitution of coking coals and upon mechanism of coke formation, and these factors are under intensive investigation for four critical coals. Coke properties, especially degradation and reactivity, are also being studied using new techniques.

O. P. Brysch

### Gas Interchangeability

Weaver, E. R. FORMULAS AND GRAPHS FOR REPRESENTING THE INTERCHANGEABILITY OF FUEL GASES. *J. Res. Natl. Bur. Standards* **46**, 213, 245 (1951) March.

Data from American Gas Association studies of the interchangeability of manufactured gases and natural gases are analyzed. A new method of determining the relationship for interchangeability is presented. These indices are given for conditions of yellow tip limits, lifting limits, flash back limits and incomplete combustion limits. Correlation is claimed to be better than the two American Gas Association indices.

D. L. Nicol

VARIOUS COMBINATIONS OF GASES. *Gas Age* **107**, 25, 26, 47 (1951) March 29.

The advent of natural gas to utilities has lead recently to the sendout of a mixed gas of about 650 Btu/SCF. The author gives typical mixtures that would be interchangeable according to the AGA "Index C."

D. L. Nicol

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Curcio, J. A., Stewart, S. and Petty, C. C. A METHOD FOR THE DETERMINATION OF FLAME TEMPERATURE FROM EMISSION IN THE ULTRAVIOLET OH BAND. p. 78.

Jensen, F. W. and Anderson, K. TEMPERATURE GRADIENTS AND TEMPERATURES IN CARBON BLACK FLAME. p. 78.

Hibbard, R. R. and Pinkel, B. FLAME PROPAGATION. IV. CORRELATION OF MAXIMUM FUNDAMENTAL FLAME VELOCITY WITH HYDROCARBON STRUCTURE. p. 78.

## 4. CARBONIZATION AND GASIFICATION

### Coal Blending

Jones, W. I. THE WORK OF THE NATIONAL COAL BOARD IN BLENDING. Brit. Coke Research Assoc., Fourth Conference Report, 42-45 London (1950) October.

The National Coal Board which has operated some 50 coking plants since January, 1947, has conducted a research program of experimental oven trials of seams and blends of seams, following a national survey of coals used in all plants. The Board is interested in blending as a means of (1) conserving the high-grade Durham coking coals (2) promoting the use of more plentiful higher and lower rank coals (3) mitigating the swelling pressures of certain South Wales coals (4) studying the mechanism of coking. The Pontypridd test oven results are discussed.

O. P. Brysch

Mott, R. A. THE ROLE OF THE TEST OVEN IN BLENDING RESEARCH. Brit. Coke Research Assoc., Fourth Conference Report, 46-47 London (1950) October.

The value of the small test oven (560-lb Midland Coke Research oven) as a research tool for testing of coals and coal blends is described. The importance of accumulating oven data, and laboratory data on many coals for purposes of comparison and correlation is emphasized.

O. P. Brysch

Parker, A. BLENDING WORK AT THE FUEL RESEARCH STATION. Brit. Coke Research Assoc., Fourth Conference Report, 35-37 London (1950) October.

The Type 301 first-grade coking coals (Durham and South Wales) which amount to only 6% of Britain's total coal reserve must be conserved. Past and current research on coal blending is directed to this objective. Experimental work on quality of coke from blends with the more plentiful gas coals (Type 401 and 501) and the higher-oxygen, weakly caking coals (Types 601 to 801) is described. The experimental 2-retort Woodall-Duckham intermittent vertical chamber plant results are compared with commercial coke oven results for 3 coals.

O. P. Brysch

Powell, A. R. and Russell, C. C. COAL BLENDING IN THE AMERICAN COKING INDUSTRY. Brit. Coke Research Assoc., Fourth Conference Report, 3-26 London (1950) October.

This paper discusses generally the coal blending practise of the 86 active coke-oven plants in the United States. The reasons for blending coals are (1) improving physical quality and uniformity of coke, (2) controlling carbonization pressures, (3) controlling yields of products and (4) utilizing inferior coking coals. Correlation of results of plant carbonizing practise and of the various testing procedures used by many research groups is reviewed. Modern improvements in the mechanics of coal blending by bins and beds are briefly described. The effects of high rate of carbonization in coking Utah coals, and the successful use of this small weak coke in the blast furnace by avoiding ore fines in the burden is mentioned. Methods for reducing the expansion pressure of coal,—(1) reduction of bulk density, (2) modification of the fluid properties of coal, (3) prevention of the formation of the plastic envelope, (4) alteration of the oven construction, (5) modification of the rate of heating,—are discussed briefly.

O. P. Brysch

Riley, H. L. THE BLENDING WORK OF THE BRITISH COKE RESEARCH ASSOCIATION. Brit. Coke Research Assoc., Fourth Conference Report, 38-41 London (1950) October.

Four aspects of the blending of coking slacks are discussed; (1) coal supplies must be reasonably constant in composition and quality, (2) efficient blending at the ovens is an engineering problem involving proper crushing, storage and mixing procedures (3) experimental oven tests are useful in selecting coals from the standpoint of transportation and

quality, (4) fundamentally important factors in blending are the agglutinating and swelling properties of the coal which are connected intimately. O. P. Brysch

Sabatier, J. L. COAL PREPARATION AND BLENDING IN THE FRENCH COKING INDUSTRY AND PRESENT PRACTISE AND RESEARCH. Brit. Coke Research Assoc., Fourth Conference Report, 27-34 London (1950) October.

The author reviews the evolution of conditions which have resulted in increases in the practise of blending. Nationalization has made possible the renovation of old plants and construction of new plants, equipped with modern preparation and blending equipment to produce uniform high quality coke. The research program on the hitherto unsuitable but plentiful Lorraine coals has found successful methods of charge preparation and blending, used at the Carling and the Thionville plants. The Marienau experimental coking plant has been valuable in developing these techniques.

O. P. Brysch

## Coal Solutions

STAGES IN THE DISSOLUTION OF COAL. *Nature* (British), **167**, 406-407 (1951) March 10.

Coal is regarded as being made up of two distinct classes of substances: (1) bitumen, or soluble extract, Wheeler's beta and gamma fractions; and (2) humin or insoluble portion, Wheeler's alpha fraction. These groups are equivalent to the ulmin fractions of British workers, and the bitumen fractions of Fischer. Complete solution of coal is followed by flocculation and precipitation of the humin. Transient fusion is explained by the separation of humin from the liquid melt. Translucent attritus consists of the amorphous or solid supersaturated solution of the coal complex, while opaque attritus represents the crystalline form. Fusain may be regarded as humin stripped of bitumen.

W. E. Ball

## Coke Ovens

Van Ackeren, J. (assigned to Koppers Co., Inc.) COKE OVEN WITH GAS RECIRCULATING MEANS. U.S. 2,541,794 (1951) February 13.

On a coke oven battery with double collecting mains, the spray-cooled raw gas is drawn by a fan from one main and moved through a crossover to the other collecting main from which it passes back into the oven top-spaces and cools the gases leaving the carbonizing charges. After five minutes this flow is automatically reversed by operating a second fan located in the other collecting main. The cooling effect of the recirculating gas prevents the decomposition of valuable byproducts.

O. P. Brysch

## Natural Gas Reforming

PROCESSES FOR REFORMING NATURAL GAS. *Am. Gas J.* **174**, 27-30 (1951) April.

Reforming or conversion of hydrocarbon gases into an increased volume of lower heating value gas is discussed. The process may be conducted in water gas generators with consumption of coke or in the presence of a catalyst. Two types of catalytic reforming are in use: one employs externally heated catalyst tubes and is continuous while a second uses cyclic operation. The latter process has been conducted by using the superheater of a water gas set as the catalytic converter, the generator and carbureter being blanked off or disconnected.

C. H. Riesz

## Propane Reforming

Sebastian, J. J. S. and Riesz, C. H. SULFUR-RESISTANT CATALYSTS FOR REFORMING PROPANE. *Ind. Eng. Chem.* **43**, 860-866 (1951) April.

The long-range aspect of catalytic reforming indicates need for sulfur-resistant catalysts. An evaluation procedure developed to measure activity and sulfur-resistance of catalysts indicated that nickel in various forms provided the most active catalysts; nickel sulfide catalysts were active in the presence of a large concentration of hydrogen sulfide; catalysts containing iron, cobalt or chromium compounds were generally less active except in combination with nickel sulfide. While exploratory in nature, the results indicate that sulfur poisoning can be overcome by development of sulfur-resistant catalysts. The research was conducted at the Institute of Gas Technology under the sponsorship of the Gas Production Research Committee as a part of Project CPR-7.

C. H. Riesz

### Sulfur Removal

Priestley, J. J. TECHNICAL AND ECONOMIC ASPECTS OF LIQUID PURIFICATION. *Gas J.* (British) **265**, 611-616, 618 (1951) March 7.

In the Manchester process, hydrogen sulfide is removed by an ammonium carbonate solution, which is subsequently treated with ferric hydroxide, and the resulting sulfide oxidized to elemental sulfur. A product of 85% purity is obtained; by distillation or extraction, the sulfur content may be raised to 99+%, which is satisfactory for the contact process. Although liquid purification costs at present average slightly higher than treatment with iron oxide, the process is considered more suitable for modern industrial conditions.

W. E. Ball

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bonner, F. and Turkevich, J. STUDY OF THE CARBON DIOXIDE-CARBON REACTION USING $C^{14}$ AS A TRACER. p. 80.

Browning, L. C. and Emmett, P. H. EQUILIBRIUM MEASUREMENTS IN THE SYSTEM $C\text{-}CH_4\text{-}H_2$. p. 80.

Mayer, I. and Ogorzaly, H. J. PRODUCTION OF LIQUID AND GASEOUS FUELS BY SYNTHESIS FROM COAL. p. 77.

Visman, J. A NEW DEVELOPMENT IN COAL SAMPLING. p. 78.

## 5. NATURAL GAS AND NATURAL GAS CONDENSATES

### Carbon Black

Kiddoo, G. CARBON BLACK. *Chem. Eng.* **58**, 104-108 (1951) March.

Channel black manufacture continues to expand but at a lesser rate than furnace black which now amounts to 56% of all carbon black manufactured. Furnace blacks give better yields of available carbon. This is particularly true when oil is used. Furnace blacks are said to have superior properties for some applications to synthetic rubber.

J. D. Parent

### Distribution

Dwight, H. M. DESIGNING A DISTRIBUTION SYSTEM TO ACCOMMODATE FUTURE EXPANSION. *Gas* **27**, 31-35 (1951) April.

This article describes briefly the methods used to redesign the existing system as well as to design a distribution system to accommodate future expansion in the Los Angeles area. Included are: the calculation of a "peak hour factor" for use in load surveys; selection of main sizes and pressures; use of central feeder loops in sections redesigned to integrate parallel systems, operating at different pressures, into one high pressure system; overall planning; checking older parts; augmenting low systems; and converting fringe areas.

J. J. Guyer

Knoblock, K. D. STREAMLINING THE TREATMENT OF MAINS WITH ANTILEAK. *Gas Age* **107**, 48-50 (1951) March 15.

The operations used by a contracting firm to apply "Carboseal" antileak to cast-iron gas mains are described in detail. The spray method is used. The spray nozzle and hose is pushed to distances of 200 ft with flexible round steel rod. The entire procedure was divided into distinct operations. One crew is used to open the pavement, a second to uncover the gas main, a third to drill and tap the main, and two crews to apply the "Carboseal." Up to 12,500 ft of pipe per day have been treated.

O. T. Bloomer

Miller, R. W. HOW FOUR UTILITIES COOPERATE TO REDUCE LEAKAGE. *Gas* **27**, 46-48 (1951) April.

Four utilities in the Pittsburgh area contribute equally to the support of a commission whose principal purpose is to eliminate leakage of gas. The procedures employed by this commission are described.

B. E. Hunt

### LPG Peak Shaving

LPG FOR STANDBY OR PEAK SHAVING. *Am. Gas Assoc. Monthly* **33**, 9, 48 (1951) April.

The advantages of LPG for a peak shaving gas are: (1) interchangeability with natural gas, (2) send-out pressures can be high, (3) quick startup and shutdown, (4) minimum personnel involved in operating, (5) location at the site

of demand, and (6) plants can be constructed in any desired capacity. LPG is expensive, however, and should be used only on the 10 to 20 days when demand will be within 10% of the peak day demand. Construction costs of typical plants are tabulated.

W. G. Bair

## LPG Recovery

Nutter, I. E. and Van Vliet, C. D. PANOMANA PLANT ACHIEVES LOW MAINTENANCE-OPERATION COSTS. PART I. *Petroleum Refiner* **30**, 71-76 (1950) April.

This plant is somewhat unique in that liquid products are propane, butane, isopentane, pentane and a 4 to 6 RVP product. Motor fuels are prepared by blending and adding TEL. The plant includes a very efficient rich oil deethanizer. Quite complete details are given.

J. D. Parent

## Motor Fuel

Samuelson, M. J. HOW LP-GAS AND GASOLINE COMPARE IN OPERATION OF TRACTORS. *LP-Gas* **11**, 56, 57, 81, 82, 84, 85 (1951) April.

LP-gas, if favorably priced, will give increased economy and increased performance with average tractor uses. Octane ratings of L.P. fuels are higher than the average gasolines and higher compression ratios can be used with a resulting increase in power per cubic inch displacement. Operating at maximum load, L. P. gases have a higher fuel consumption than gasolines (based on gals. fuel per hp hr) but for loads less than maximum the difference decreases rapidly. For light loads and idling the L.P. gas consumption is less than the gasoline consumption. Maintenance problems and engine wear are reduced. The periodic engine overhaul may occur about half as often as when using gasoline regularly. A big disadvantage to midwest uses is problem of cold weather starting. Contrary to expectations, gasoline engines will start much easier in cold weather than L.P. gas engines.

W. G. Bair

## Synthetic Fertilizers

McCullough, G. W., Perry, C. W. and Ogilvie, R. S. FERTILIZER FROM PETROLEUM. *Petroleum Processing* **6**, 380-387 (1951) April.

The increasing importance of natural gas in the fixation of atmospheric nitrogen is illustrated by the fact that whereas in 1940 only 5% of the U.S. synthetic ammonia was manufactured from natural gas, in 1950 it rose to 45%. The plant of the Phillips Chemical Co. at Etter, Texas producing ammonia, nitric acid, ammonium nitrate and ammonium sulfate is described.

C. H. Riesz

## Underground Storage

Serif, M. PEOPLES GAS PLANS HUGE UNDERGROUND STORAGE RESERVOIR. *Gas Age* **107**, 24, 49, 50 (1951) March 29.

Peoples Gas, Light & Coke Co. is investigating the possibility of storing gas in a water sand at Herscher, Illinois. It is also considering storage in a cavern to be quarried from solid rock.

J. D. Parent

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Brooner, G. M. THE SELECTION OF TREATING PROCESSES FOR GASOLINE PLANTS. p. 76.

Kalichevsky, V. A. SWEETENING AND DESULFURIZATION OF LIGHT PETROLEUM PRODUCTS. PART IV. HYPOCHLORITE TREATMENT. p. 76.

Russell, G. F. PORTABLE LOW-TEMPERATURE PROCESSING EQUIPMENT. p. 84.

Sebastian, J. J. S. and Riesz, C. H. SULFUR-RESISTANT CATALYSTS FOR REFORMING PROPANE. p. 73.

THE AMAZING GROWTH OF UNDERGROUND STORAGE. p. 69.

PROCESSES FOR REFORMING NATURAL GAS. p. 73.

# 6. PETROLEUM AND SYNTHETIC LIQUID FUELS

## Catalytic Processes

Anderson, R. B., Hofer, L. J. E., Cohn, E. M. and Seligman, B. STUDIES OF THE FISCHER-TROPSCH SYNTHESIS. IX. PHASE CHANGES OF IRON CATALYSTS IN THE SYNTHESIS. *J. Am. Chem. Soc.* **73**, 944-946 (1951) March.

Phase changes in a reduced fused-iron catalyst during Fischer-Tropsch synthesis were determined. The catalyst was originally 69% alpha-iron and 31% non-magnetic iron. In the first few days, alpha-iron was converted to Hägg carbide ($Fe_2C$), increasing to a maximum of 29% at 200 hours of synthesis. From this point to 1800 hours, the Hägg carbide iron decreased slowly (21% at 1800 hours). Magnetite ($Fe_3O_4$) was formed at a slower rate (38% at 1800 hours) than Hägg carbide, apparently at the expense of the alpha-iron phase. Non-magnetic iron was constant (31-33%) throughout the test. During the period from 200 to 1800 hours where these changes occurred, catalytic activity was essentially constant.

C. H. Riesz

Fahnestock, F. C. (assigned to Socony-Vacuum Oil Co., Inc.) HYDROCARBON CONVERSION AND CATALYST REGENERATION APPARATUS. U.S. 2,548,295 (1951) April 10.

The inventor claims a new method of gas collection and distribution in a moving bed catalyst chamber that minimize "bumping" in the bed. The inventor supplies vertically spaced, alternate product-collector and feed-distribution members throughout the catalyst column. The distribution and collector members are of the inverted-trough type with the edges of all distributor members serrated or saw-toothed. The serrations or teeth should be 1 to 3 in. from base to apex and the sides should form an angle of 50 to 70° with the horizontal.

W. G. Bair

Grebe, H. A., Miles, A. L. and Seed, K. W. GLADEWATER PUTS PERCO UNIT IN OPERATION. *Oil Gas J.* **49**, 80-81 (1951) April 12.

A Perco cycloversion unit (650 bbl/day) for upgrading gasoline was placed in service at Gladewater, Texas. A unique feature is the shop-fabrication of most of the plant on three skids; three direct fired heaters were erected on the site.

C. H. Riesz

66,000 BBL A DAY PLATFORMING CAPACITY. *Petroleum Engr.* **23C**, 33-36 (1951) April.

Fourteen oil refiners are operating or have under construction 66,000 bbl/day of Platforming capacity.

C. H. Riesz

## Gasoline Desulfurization

Brooner, G. M. THE SELECTION OF TREATING PROCESSES FOR GASOLINE PLANTS. *Petroleum Refiner* **30**, 95-99 (1951) April.

A brief review of the better known operations and their applications to the treatment of the normal products of a gasoline plant for removal of hydrogen sulfide and free sulfur and either the removal or conversion of mercaptan sulfur is presented. In the author's opinion the most practical and economic treating system for the average gasoline plant comprises: (1) removal of $H_2S$ from the gas prior to absorption; (2) a caustic or amine solution wash on the propane LPG production; (3) copper sweetening of the debutanizer feed, or when mercaptan content is high, a combination of regenerative caustic wash and copper treating.

H. Hakewill

Kalichevsky, V. A. SWEETENING AND DESULFURIZATION OF LIGHT PETROLEUM PRODUCTS. PART IV. HYPOCHLORITE TREATMENT. *Petroleum Refiner* **30**, 95-96 (1951) February.

The chemistry of hypochlorite treatment for sweetening petroleum distillates is reviewed and discussed. Other methods are now in general use except that natural gasoline is occasionally treated by this procedure. There are 54 patent references.

C. H. Riesz

## Middle East Oil

MIDDLE EASTERN PIPELINES. *Petroleum* (British) **14**, 94-96 (1951) April.

Tapline, the Trans-Arabian Pipeline Company's 1068-mile, 30-inch pipeline, began to deliver oil from the Persian Gulf Abqaiq oilfields in Saudi Arabia to tankers in the Mediterranean harbor

of Sidon, Lebanon, in December, 1950. This $200 million pipeline will handle 320,000 bbl per day when full capacity is reached in March and will free 60 to 80 tankers formerly hauling via the Suez Canal. 325,000 tons of steel were used in the line, harbors and tanks. The Iraq 12- and 16-inch lines from Kirkuk, Iraq, to Tripoli, Lebanon, are handling 4 million tons oil/year but the two southern branches of this line to Haifa, Palestine, are idle. A new 565-mile 30-inch line from Kirkuk to Banias, Syria (13 million tons/year) is progressing, with completion expected in 1953. Of the estimated 1950 world production of 3,799,864,000 U.S. bbls, the U.S.A. produced 1,965,448,000, Venezuela 500,323,000, and the Middle East 639,319,000, the latter increasing more than fivefold over 1939.

O. P. Brysch

## OPS Price Order

PARTIAL TEXT OF WHOLESALE OIL PRICE ORDER. *Natl. Petroleum News* **43**, 53, 55, 56, 58, 60 (1951) April 11.

Partial text of wholesale oil prices is printed. A wide variety of liquid hydrocarbon fuels is covered in the OPS price ceiling order including natural gas liquids, gas oils and gas enrichment oils. The ceiling price for natural gasoline shall be the posted purchase price of January 25, 1951 for the field in question. The ceiling for LPG is based on the highest price in the period December 19, 1950 to January 25, 1951.

J. D. Parent

OPS ISSUES NEW WHOLESALE OIL PRICE ORDER TO REMOVE 'DISTORTIONS' OF EARLIER CEILINGS. *Natl. Petroleum News* 43, 21, 22 (1951) April 11.

Sales of petroleum products at wholesale levels are controlled by ceiling price order CPR 17. Retail prices are covered by order CPR 13. Exceptions are listed.

J. D. Parent

## Synthetic Fuels

Mayer, I. and Ogorzaly, H. J. (assigned to Standard Oil Development Co.) PRODUCTION OF LIQUID AND GASEOUS FUELS BY SYNTHESIS FROM COAL. U.S. 2,543,795 (1951) March 6.

Coal and iron oxide catalyst are mixed in a fluid bed at 1000°F, and carbonization and methane synthesis are carried on simultaneously by injecting the fluidizing CO and $H_2$ below. The outlet gases are freed of dust and tars. Part of the fluidized coke-catalyst bed is drawn off continually to a separator operating at lower fluidization velocities, wherein the iron catalyst forms a bottom layer which is drained, reheated and recycled to the carbonizer-synthesizer vessel while the coke of the top layer is drained to a separate fluid gasifier for generating the synthesis gas. Fresh iron catalyst may be added with the coal, while corresponding withdrawals occur at the separator. Promoters (potassium carbonate) may be added in the gasifier.

O. P. Brysch

## Thermal Cracking

Little, D. M. and Merryfield, G. E. HIGH DESTRUCTION THERMAL CRACKING OF CATALYTIC CYCLE OIL. *Oil Gas J.* **49**, 242, 246, 247, 249 (1951) March 29.

Catalytic cycle gas oil was thermally cracked at high destruction conditions to produce high-octane gasoline. The results of a pilot plant unit showed that the aniline-point reduction of the gas oil served as an indication of the severity of the cracking. Short residence times at high uniform heat-transfer rates were essential. Results from commercial box furnace and radiant furnace operation are also presented.

C. H. Riesz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Anderson, R. B., Friedel, R. A. and Storch, H. H. FISCHER-TROPSCH REACTION MECHANISM INVOLVING STEPWISE GROWTH OF CARBON CHAINS. p. 81.

Samuelson, M. J. HOW LP-GAS AND GASOLINE COMPARE IN OPERATION OF TRACTORS. p. 75.

# 7. ANALYTICAL METHODS AND TESTS

## Carbon Monoxide

Grant, G. A., Katz, M. and Haines, R. L. A MODIFIED IODINE PENTOXIDE METHOD FOR THE DETERMINATION OF CARBON MONOXIDE. *Can. J. Technology* **29**, 43-51 (1951) January.

Improvements in apparatus, purification reagents, and estimation of liberated iodine are described. A Beckman spectrophotometer was employed to determine iodine absorbed in 5% KI solution at a wave length of 2880 A. Analyses of ten synthetic CO-$N_2$ mixtures ranging from 0.007% to 0.09% CO yielded results accurate to 1% for samples containing 0.1% CO, 5% for samples containing 0.002% CO, and 20% for samples containing less than 0.001% CO. Determined values were consistently lower than calculated values; which effect was attributed by the authors to the possibility of incomplete reaction of CO with $I_2O_5$ under test conditions or loss of liberated iodine by absorption on cool glass surfaces. It was further shown that $H_2$ in concentrations of 0.05% or more reacted with $I_2O_5$ to liberate iodine and thus interfered with CO determination.

H. Hakewill

Minchin, L. T. CARBON MONOXIDE. *Coke & Gas* (British) **13**, 61-62 (1951) February.

The toxic effects of carbon monoxide are discussed, and methods for its determination briefly reviewed. H. Hakewill

## Coal Sampling

Visman, J. A NEW DEVELOPMENT IN COAL SAMPLING. INTERNATIONAL CONFERENCE ON COAL PREPARATION, PARIS, 1950. SECOND SECTION (B4). *Revue de l'Industrie Minerale* (French) Special Issue No. 2, 134-144, (1950) Dec.

Consideration of the theoretical aspects of sampling indicated that accuracy would be much improved by changing from manual to automatic sampling. The calculated accuracy of a 40-lb. sample of 12 increments per shift was 1.7% ash (99 out of 100), and that of a 20-lb. sample of 150 increments only 0.6% ash. Duplicate sampling with sampling pipes indicated that the actual error was only 0.1% ash.

W. E. Ball

## Flame Research

Curcio, J. A. Stewart, S. and Petty, C. C. A METHOD FOR THE DETERMINATION OF FLAME TEMPERATURE FROM EMISSION IN THE ULTRAVIOLET OH BAND. *J. Optical Soc. Am.* **41**, 173-179 (1951) March.

A new method for flame temperature measurement has been developed involving measurement of radiation emitted by flames, in a narrow wave-length interval within the ultraviolet OH emission band. The mean value of flame emissivity within the wavelength interval is evaluated by measurement of mean flame transmission for a continuous spectrum source. The method requires that the wavelength interval studied be so narrow that the emission of the source used for transmission measurement and that of a blockbody at flame temperature both be approximately constant over the interval. The method has been tested on steady flames over temperature ranges from 2000°K to 3000°K and agreement within 10% of temperature measured was obtained with sodium line reversal measurements. D. L. Nicol

Jensen, F. W. and Anderson, K. TEMPERATURE GRADIENTS AND TEMPERATURES IN CARBON BLACK FLAME. *Ind. Eng. Chem.* **43**, 176-181 (1951) January.

The paper describes a study of the diffusion flame used in carbon black manufacture. Temperatures were studied and gradients were mapped, as well as the regions of carbon formation. Temperature measurement methods included both the platinum-platinum rhodium thermocouple and optical line-reversal methods.

S. Katz

Hibbard, R. R. and Pinkel, B. FLAME PROPAGATION. IV. CORRELATION OF MAXIMUM FUNDAMENTAL FLAME VELOCITY WITH HYDROCARBON STRUCTURE. *J. Am. Chem. Soc.* **73**, 1622-1625 (1951) April.

An empirical correlation has been developed to correlate the maximum burning velocity of thirty-four hydrocarbons, measured by M. Gerstein, O. Levine, E. L. Wong, *J. Am. Chem. Soc.* **73**, 418 (1950). The correlation uses the relationship formed by various types of C-H and C-C bonds to cover all types of alkanes, alkenes, and alkynes including isomers. Average difference between calculated and observed flame velocity is less than 2%. D. L. Nicol

## Flue Gas Analysis

Reed, R. THE ORSAT. *Gas* 27, 45-46 (1951) March.

Procedures for sampling and making flue gas analyses with an Orsat apparatus and interpretating the data obtained for the purpose of maintaining efficient fuel utilization in plant operation are discused. Application of flue gas composition tests to controlling the operation of typical furnaces burning natural gas is illustrated.

H. Hakewill

## Fuel Gas Analysis

Lyles, A. C. and Montague, R. A. DETERMINATION OF CARBON DIOXIDE AND OXYGEN IN NATURAL GASES. *Petroleum Refiner* 30, 93-94 (1951) April.

Standard apparatus and procedure prescribed in California Natural Gasoline Association's Bulletin TS-501 for the determination of $CO_2$ and $O_2$ in natural gas is presented. Units for laboratory and field use consisting of Orsat-type equipment are specified; these utilize potassium hydroxide solution for $CO_2$ absorption and chromous chloride reagent for $O_2$ absorption. The laboratory version employs mercury for gas confinement and should give results accurate to $\pm 0.1\%$; while the portable field model employs an aqueous solution for gas confinement and should give results accurate to $\pm 0.2\%$.

H. Hakewill

Nash, L. K. GAS ANALYSIS. *Anal. Chem.* 23, 74-81 (1951) January.

Advances reported in the recent literature in the field of gas analysis were reviewed, and references to 188 publications on the subject cited. Topics considered were: extraction and sampling, general instrumental methods (spectroscopy, spectrophotometry, and mass spectrometry), other instrumental methods, methods based on reversible equilibria between gas and condensed phase, special chemical methods (gravimetric, titrimetric, colorimetric, turbidimetric, and electrometric methods for sulfur compounds, halogens and halogen compounds, carbon oxides, oxygen, water, and other gases), and volumetric methods.

H. Hakewill

Slobod, R. L. LOW TEMPERATURE SEPARATION OF ETHANE FROM METHANE AND AIR. *Anal. Chem.* 23, 361-363 (1951) February.

Data are presented which indicate that ethane is quantitatively retained in a cold trap at $-210^\circ$C whereas it is not at $-196^\circ$C (the normal boiling point of liquid nitrogen). Temperatures down to $-210^\circ$C can be produced by maintaining liquid nitrogen at reduced pressure. This method can be used to determine trace amounts of ethane and heavier hydrocarbons in air samples.

O. T. Bloomer

## Gas Sampling

Squires, R. M. (assigned to Socony-Vacuum Oil Co., Inc.) APPARATUS FOR COLLECTING SOIL GAS SAMPLES. U.S. 2,545,900 (1951) March 20.

A device for withdrawing a definite volume of soil gases from the earth under constant pressure conditions is described for use in geochemical prospecting for petroliferous deposits. A high degree of reproducibility in sampling is claimed. Further advantageous use of the apparatus to obtain rough but rapid indications of relative soil permeability depends upon the withdrawal of a constant volume of gas under constant reduced pressure conditions; the time required for gas withdrawal being indicative of the permeability of the soil in the particular sampling zone.

H. Hakewill

## Organic Analysis

Smith, W. T., Jr. and Buckles, R. E. VOLUMETRIC ANALYTICAL METHODS FOR ORGANIC COMPOUNDS. *Anal. Chem.* 23, 66-73 (1951) January.

Analytical advances reported in the literature from October, 1949 to September, 1950 in the field of organic chemistry were briefly reviewed, and references to 151 publications on the work cited. Included under determination of elements were: carbon, halogens, nitrogen, oxygen, phosphorus and sulfur. Functional groups considered were: acetyl, acids, alcohols, aldehydes and ketones, amides, amines, amino acids, diazonium groups, hydrazines, oxirane group, peroxides, phenols, unsaturation, and germanium derivatives. Miscellaneous methods included: Grignard reagents, mixtures, silicon derivatives, sugars, water, and unclassified materials.

H. Hakewill

### Oxygen Determination

DIRECT DETERMINATION OF OXYGEN IN ORGANIC COMPOUNDS. *Anal. Chem.* 23, 530-533 (1951) March.

Various investigators have reported the Unterzaucher method as satisfactory, and an increasing number of laboratories are now employing it as a routine procedure. The method involves pyrolysis of the sample in a stream of inert gas, and conversion of the oxygen to carbon monoxide by carbon at 1120° C. The carbon monoxide may then be determined by several methods. This round-table discussion of details of the procedure indicates that the method is basically sound, but that the necessary conditions for carrying out the analysis must be carefully observed. W. E. Ball

### Petroleum Analysis

Levin, H. PETROLEUM. *Anal. Chem.* 23, 231-237 (1951) February.

Analytical advances reported in the literature over a one year period during 1949 and 1950 in the field of petroleum are briefly reviewed and references to 173 publications covering the work are cited. Topics considered included: crude oil, gas, gasoline, kerosine and heavier fuels, lubricating oil, asphalt, specialties, pollution, elements, sulfur and its compounds, catalysts, and miscellaneous. H. Hakewill

### Spectrometric Methods

Bacher, J. E. STATISTICAL PROCEDURES FOR COUNTER-CURRENT DISTRIBUTION AND DIFFERENTIAL SPECTROSCOPY. *J. Am. Chem. Soc.* 73, 1023-1027 (1951) March.

Formulae are presented for the distribution coefficient of a single solute computed from the fit of a binomial distribution to the counter-current distribution data. It is inferred that the dispersion of a counter-current distribution is sensitive to operation at disequilibrium. Equations for the quantitative analysis of mixtures were derived from the data of counter-current distribution by the method of least squares. Increased precision and sensitiveness to trace contaminants over the use of differential spectroscopy procedures alone were claimed.

C. W. Ade

Philpotts, A. R., Thain, W. and Smith, P. G. EFFECT OF FINITE SLIT WIDTH ON INFRARED ABSORPTION MEASUREMENTS. *Anal. Chem.* 23, 268-272 (1951) February.

Deviations from the Beer-Lambert law caused by a finite width are treated mathematically, and found to fit experimental data. A method of correlating data taken at different slit settings, and of correcting extinction coefficients to "infinite resolving power" is given.

D. V. Kniebes

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Minchin, L. T. GAS APPLIANCE TESTING IN GERMANY. p. 71.

Weaver, E. R. FORMULAS AND GRAPHS FOR REPRESENTING THE INTERCHANGEABILITY OF GASES. p. 71

VARIOUS COMBINATION OF GASES. p. 71.

## 8. GENERAL AND PHYSICAL CHEMISTRY

### Carbon Reactions

Bonner, F. and Turkevich, J. STUDY OF THE CARBON DIOXIDE-CARBON REACTION USING $C^{14}$ AS A TRACER. *J. Am. Chem. Soc.* 73, 561-569 (1951) February.

The carbon-carbon dioxide reaction was studied, using radioactive $C^{14}$ and charcoal in a system employing recycling and continuous radioactivity monitoring of the gaseous phase. Temperatures between 500 and 848°C were studied. A mechanism was proposed consisting of a rapid reduction of the carbon dioxide at the surface to give an oxygenated surface without exchange between the solid and gas phase carbon. This is followed by a slow two-stage unimolecular decomposition of the oxygenated surface to yield additional carbon monoxide.

S. Katz

Browning, L. C. and Emmett, P. H. EQUILIBRIUM MEASUREMENTS IN THE SYSTEM C-$CH_4$-$H_2$. *J. Am. Chem. Soc.* 73, 581-583 (1951) February.

The equilibrium constants for reaction $CH_4 = C + 2H_2$ for temperatures between 380-838°C were experimentally determined. The free energy values were then calculated from these constants and from the empirical specific heat equation. The free energy values were compared to those obtained by Rossini and were

found to be about 300 k cal per mole less in each case. This was attributed to the differences in the structure of the carbons used.

S. Mori

### Catalyzed Reactions

Anderson, R. B., Friedel, R. A. and Storch, H. H. FISCHER-TROPSCH REACTION MECHANISM INVOLVING STEPWISE GROWTH OF CARBON CHAIN. *J. Chem. Phys* **19**, 313-319 (1951) March.

Expressions are derived on the assumption that Fischer-Tropsch synthesis of hydrocarbons occurs by a stepwise addition of one carbon atom to the end or to adjacent-to-end carbons of the longest carbon chain growing at the catalyst surface. The observed isomer and carbon number distributions agree satisfactorily with predicted values.

C. H. Riesz

Kummer, J. T. and Emmett, P. H. EXCHANGE BETWEEN $N_2^{30}$ AND $N_2^{28}$ OVER IRON CATALYSTS. *J. Chem. Phys.* **19**, 289-292 (1951) March.

The rates of exchange between $N_2^{28}$ and $N_2^{30}$ over promoted iron catalysts are consistent with the assumption that all nitrogen evaporating from the catalyst surface is completely equilibrated with respect to the nitrogen isotope exchange. Hydrogen accelerated the exchange; small traces of surface oxides poisoned the isotope exchange.

C. H. Riesz

Sherburne, R. K. and Farnsworth, H. E. ACTIVATION OF A SOLID NICKEL CATALYST FOR THE HYDROGENATION OF ETHYLENE BY HEAT TREATMENT IN A HIGH VACUUM. *J. Chem. Phys.* **19**, 387-388 (1951) March.

An electropolished nickel surface was found to have enhanced catalytic activity for ethylene hydrogenation after heating at a dull red heat for 3.5 hours. Generally, such treatment would cause sintering and loss in activity; however, since the surface is smooth initially, the heat treatment is believed necessary to produce a more gas-free surface at temperatures much higher than usually employed.

C. H. Riesz

### Phase Equilibria

Aroyan, H. J., Katz, D. L. LOW TEMPERATURE VAPOR-LIQUID EQUILIBRIA IN HYDROGEN-N-BUTANE SYSTEM. *Ind. Eng. Chem.* **43**, 185-189 (1951) January.

Equilibrium vapor and liquid phase compositions for the hydrogen-*n*-butane system were determined at pressures from 300 to 8000 pounds per sq in. along isotherms of 75°, 40°, 10°, -20°, -50°, -100°, -150°, and -200°F. Phase compositions and equilibrium constants are presented for this system. A graphical correlation for the prediction of the equilibrium constant for hydrogen in binary hydrogen-hydrocarbon systems is included. The phenomenon of a minimum in the bubble-point curve is observed for this system.

Authors' abstract

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bundy, F. P., Strong, H. M. and Gregg, A. B. Jr. METHOD OF MEASURING GAS PRESSURE IN FLAMES. p. 85

## 9. ORGANIC CHEMISTRY

### Isotopic Alkanes

Wagner, C. D. and Stevenson, D. P. THE PREPARATION AND PURIFICATION OF METHANE-d, ETHANE-d, PROPANE-1-d, PROPANE-2-d, n-BUTANE-1-d, n-BUTANE-2-d, ISOBUTANE-1-d[1] AND ISOBUTANE-2-d[1]. *J. Am. Chem. Soc.* **72**, 5785 (1950) December.

Methods of preparation of deutero-substituted alkanes with Grignard reagents for use in hydrogen exchange studies are described. The only impurities present in appreciable amounts are the ordinary hydrocarbons in percentages between 0.5 and 4.

S. Katz

Wagner, C. D., Stevenson, D. P. and Otvos, J. W. THE SYNTHESIS OF CARBON-ISOTOPIC[1] ALKANES: METHANE-$C^{13}$, PROPANE-1-$C^{13}$, n-BUTANE-1-$C^{13}$, n-BUTANE-1-$C^{14}$ AND ISOBUTANE-1-$C^{13}$, ISOBUTANE-1-$C^{14}$ AND ISOBUTANE-2-$C^{13}$. *J. Am. Chem. Soc.* **72**, 5786 (1950) December.

Procedures are indicated for the synthesis of carbon-isotopic paraffins for use in the study of reaction mechanisms.

S. Katz

## Organic Sulfur Compounds

MERCAPTANS AND DISULFIDES. *Chem. Eng.* 58, 176-179 (1951) March.

A brief description, flow diagram, and pictures of units in operation in the production of high purity tertiary mercaptans and disulfides from hydrogen sulfide and olefins at Phillips Petroleum Co. plant near Borger, Texas are presented.

H. Hakewill

## Xylene Production

WHAT'S NEW: MORE XYLENES LOOM. *Chem. Inds. Week* 68, 17, 19, 20 (1951) March 31.

Along with expanded benzene-production, it is anticipated that 160 million gallons of xylenes will become available. Ortho-xylene is readily oxidized into phthalic anhydride. DuPont's latest synthetic fiber, variously called Fibre V, Amilar and Dacron, is based on ethylene glycol and terephthalic acid, the latter derived from para-xylene. Uses for isophthalic acid formed from meta-xylene appear possible. Fractionation of the xylene isomers appears justified economically.

C. H. Riesz

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Smith, W. T., Jr., and Buckles, R. E. VOLUMETRIC ANALYTICAL METHODS FOR ORGANIC COMPOUNDS. p. 79.

DIRECT DETERMINATION OF OXYGEN IN ORGANIC COMPOUNDS. p. 80.

# 10. CHEMICAL ENGINEERING

## Cooling Towers

Findlay, A. G. THE SELECTION OF WATER COOLING TOWERS. *Coke & Gas* (British) 13, 89-92 (1951) March.

The decreasing supply of water, with the attendant necessity for conservation, will make the selection of means of efficient cooling a matter of increasing concern. Advantages and disadvantages of cooling and spray ponds, natural-draught timber towers and concrete towers and mechanical-draught cooling towers are discussed. The induced-draught tower is considered the most advanced form of water cooling equipment. Wet-bulb temperature approach and cooling range make a tremendous difference in costs, so that comparisons must be on the same bases.

C. L. Tsaros

## Dust Removal

Whiton, L. D., Watson, J. E., McBride, C. B. and Remington, F. (assigned to Prat-Daniel Corp.) APPARATUS FOR CENTRIFUGALLY SEPARATING SUSPENDED PARTICLES FROM GASES. U.S. 2,546,246 (1951) March 27.

An apparatus for centrifugally separating suspended particles from gases is described, which consists of a scroll-shaped sheet of metal rolled to provide a targential entrance. Three such scrolls are mounted one above another, forming a continuous inlet. The clean gases pass upward and out, while the dust settles down around the periphery, dropping into a collecting hopper. A number of alternate arrangements are shown.

C. L. Tsaros

## Gas Washer

Fenn, O. E. (assigned to Peters-Dalton, Inc.) GAS WASHER. U.S. 2,546,259 (1951) March 27.

A gas washer is described consisting of a trough mounted at the bottom of the tower from which water constantly overflows, striking the opposite wall, thus forming a curtain through which the ascending gas must pass. The gas stream entrains the water and the mixture strikes an

arc-shaped baffle which deflects water and solid particles to the rear wall behind the above trough. The arc-shaped baffle extends from the front wall past the center of the vessel. A second, straight baffle is mounted above the first extending fro mthe rear wall, overlapping the lower baffle. The trough and two baffles cause the gas to take a tortuous path through the vessel. A blower is mounted atop the tower to induce the gas flow.

C. L. Tsaros

## Heat Transfer Research

Kazakova, E. A. MAXIMUM HEAT TRANSFER TO BOILING WATER AT HIGH PRESSURES. *Engrs. Digest* (British) **12**, 81-85 (1951) March.

Tests were made on boiling water under pressures from 1 to 200 atmospheres using an electrically-heated 0.15 mm diameter platinum wire as the boiling surface. From 1 to 64 atmospheres the surface of the wire remained clean. Above 90 atmospheres evidence of heat corrosion and salt deposition was visible on the wire surface. These deposits were amorphorus silicon compounds formed at high pressures from the porcelain and quartz tubes used for the insulation of leads in the boiler. To compare the effect of pressure on rate of heat transfer ratio, the ratio of q *max*, the critical heat transfer at the test pressure to q *max* at atmospheric pressure, was used. Over the pressure range 1 to 200 atmospheres, the ratio of the former to the latter gives a curve rising to a maximum ratio of 3.5 to 4.5 at a pressure of 65-90 atmospheres and then falling to a value of about one at 180-190 atmospheres. The falling ratio corresponds to the appearance of the deposits.

C. L. Tsaros

Chu, J. C., Dmytryszyn, M., Tichy, W., Kubik, K. C. and Smith, O. L. HEAT-TRANSFER COEFFICIENT OF CONDENSING VAPORS. *J. Applied Chem.* (British) **1**, 73-80 (1951) February.

Condensing coefficients of trichloroethylene, bromobenzene, nitromethane, and n-hexyl alcohol were determined using a water-cooled brass cylinder 0.314 in. OD 12.47 in. long. Condensing coefficient, $h_0$ is shown to be a function of rate of heat transfer, q, raised to the minus 1/3 power. Overall temperature difference was held constant by varying the pressure in the vapor space. From curves of constant temperature difference, crossplots at constant q were made which permitted determination of $h_0$ by extrapolation to infinite water velocity. Comparison of observed values with those calculated from the Nusselt equation was made. Good agreement is obtained for trichloroethylene and bromobenzene, but for nitromethane and n-hexyl alcohol the observed values are only about one-half those calculated from the equation.

C. L. Tsaros

## Iron Oxide Reduction

Tiddy, W. and Cooper, F. D. (assigned to Allied Chemical & Dye Corp.) TWO-STAGE CONVERSION OF IRON OXIDE INTO IRON. U.S. 2,545,932 (1951) March 20.

Coke oven gas is passed through or over iron oxide at 1300°F until 95% of the oxygen is removed. Hydrogen or hydrogen-nitrogen mixture containing 4 to 20 grains of water per cu ft is then introduced at 1400°F until 98% of the oxygen is eliminated and the carbon content is reduced to less than 0.55%.

W. E. Ball

Tiddy, W. and Cooper, F. D. (assigned to Allied Chemical & Dye Corp.) CONVERSION OF IRON OXIDE INTO IRON WITH COKE-OVEN GAS. U.S. 2,545,933 (1951) March 20.

Coke oven gas is recirculated in contact with iron oxide at 1800°F, maintaining the moisture in the gas below 20 grains per cu ft. Recirculation is continued until at least 50% of the methane in the coke oven gas is decomposed, and the $CO_2$ content has increased to at least 10%. This procedure removes 99% of the oxygen from the oxide, gives a product containing less than 0.26% carbon.

W. E. Ball

## Oxygen Production

Kapitza, P. L. MEANS FOR PRODUCING LIQUID AIR RICH IN OXYGEN. U.S 2,548,-377 (1951) April 10.

By the use of three progressive heat-exchangers and an expansion turbine, air at *pressures of 5 to 10 atmospheres* is *partially* liquefied. Only

4-7% of the oxygen of the air cooled in the system is condensed, the liquid phase containing 35-45% oxygen and the gas phase containing 14-17% oxygen at equilibrium. The compressed cooled gases from inside the final exchanger tubes chill the tube-chest of the intermediate exchanger to 110°-130°K, and are then expanded in a (Kapitza) turbine to 1.1 atmospheres. Expansion chills the air to about 94°K (-179°C), at which temperature it passes to the tube chest of the final exchanger to perform the final cooling and partial liquefaction. The liquid phase (35-45% $O_2$) from inside the final exchanger tubes passes a valve-control to the top of a plate rectifier where liquid oxygen is concentrated and drains to an evaporator space coextensive with the tube-chest of the final exchanger. The level of liquid in the chamber determines the amount of evaporated oxygen flowing back against the reflux through the rectifier and the purity of the delivered liquid oxygen is thus regulated by maintaining the proper level. The gaseous phase above this liquid in the tube chest and from the top of the rectifier passes out to cool the initial heat exchanger.

O. P. Brysch

### Sprays

Cooper, L. M. (assigned to Standard Oil Development Co.) SPRAY HEAD FOR FLUID RECEPTACLES. U.S. 2,545,991 (1951) March 20.

A dispensing device for containers of fluids under gaseous pressures is described. It is a plunger type, with a perforated tube which can be depressed into the liquid when flow is desired and raised when no flow is desired so that the perforations are sealed by a tight-fitting elastic ring.

C. L. Tsaros

### Unit Operations Review

CHEMICAL ENGINEERING UNIT OPERATIONS. *Ind. Eng. Chem.* 43, 37-116 (1951) January.

The sixth consecutive Chemical Engineering Unit Operations Review is presented. Authorities in the various fields review the developments and present bibliographies covering the past year. The unit operations covered include: absorption; humidification; adsorption; centrifugation; crystallization; high temperature distillation; high vacuum distillation; drying; evaporation; solvent extraction; filtration; fluid dynamics; heat transfer; ion exchange; materials handling; mixing; size reduction.

L. Ciboch

## 11. PROCESS EQUIPMENT AND INSTRUMENTATION

### Compressor Maintenance

Ridgway, R. S. PREVENTIVE MAINTENANCE FOR ENGINES AND COMPRESSORS. *Petroleum Refiner* 30, 64-70 (1951) April.

Preventive maintenance for compressors is discussed. Illustrations showing such conditions as wear and carbon deposition greatly add to the value of this article.

J. D. Parent

### Cooling by Expansion

Russell, G. F. PORTABLE LOW-TEMPERATURE PROCESSING EQUIPMENT. *Petroleum Refiner* 30, 81-83 (1951) April.

Low temperature processing equipment using the cooling effect attending gas-pressure reduction is discussed. The application is to portable units on gathering lines where flow-rate is too small to justify an expensive gasoline plant. Simultaneous dehydration and hydrocarbon liquid recovery is featured.

J. D. Parent

### Fluid-System Valve

Bergstrom, E. V. (assigned to Socony-Vacuum Oil Co., Inc.) FLUIDIZED CATALYTIC CRACKING SYSTEM WITH ROTATING DISK SLIDE VALVE. U.S. 2,547,900 (1951) April 3.

A rotating disk slide valve for use in a fluid catalytic system is described which will close off the solid catalyst stream. The valve operates in a circular chamber without grooves or recesses which would tend to clog or jam the

valve. The inventor claims a gas tight seal and no jamming or clogging in operation.

W. G. Bair

## Galvanic Currents

Godard, H. P. A NEW INSTRUMENT FOR MEASURING GALVANIC CORROSION CURRENTS. *Corrosion* 7, 93-97 (1951) March.

After a brief discussion of the theory of galvanic corrosion a new instrument for measuring corrosion currents is described. This instrument is of the "zero-resistance ammeter circuit type." Galvanometer deflection activates relays which then operate a motor-driven balancing rheostat to achieve a current input to the galvanic couple which just balances the output of the couple.

B. E. Hunt

## Heat Exchangers

IS YOUR PROBLEM CLEANING EXCHANGERS? *Petroleum Processing* 6, 370-373 (1951) April.

Three different methods of cleaning are used in the Houston refinery of Shell Oil Co.: (1) mechanical cleaning, (2) chemical cleaning and (3) wet sandblasting. About 90% of tube side cleaning is done by wet sandblasting. Chemical cleaning, in a 16 ft deep pickling vat, produces good results where only a few tubes or none at all are plugged, and is followed by jetting with 650 psig water to knock off loosened deposits. Mechanical cleaning is most useful on hard and insoluble scale, or where many tubes are plugged. With this method a rotary drill or a commercial water jet, for soft scales, are used.

C. L. Tsaros

## Photoelectric Dust Meter

Stone, D. E., Kane, L. J., Corrigan, T. E., Wainwright, H. W. and Seibert, C. B. INVESTIGATION OF A PHOTOELECTRIC DEVICE FOR THE DETERMINATION OF LOW CONCENTRATIONS OF DUST. *U.S. Bureau of Mines Report of Investigations* 4782 (1951) March.

A method was developed for testing instruments for continually determining small concentrations of dust in gas in connection with the purification of synthesis gas for the production of synthetic liquid fuels. An instrument, designed and built by the Ess Instrument Co., that continually compared in photoelectric cells the intensity of similar light beams passing through test gas and clean air was found to have a sensitivity of 0.75 grains of dust per CCF. Since the maximum permissible concentration of dust has been set at 0.05 grain per CCF, work is being continued in an effort to improve the sensitivity of the Ess instrument.

H. Hakewill

## Pressure Measurement

Bundy, F. P., Strong, H. M. and Gregg, A. B., Jr. (assigned to General Electric Co.) METHOD OF MEASURING GAS PRESSURE IN FLAMES. U.S. 2,545,340 (1951) March 13.

This invention relates to a method of measuring gas pressure within flames from wavelength changes in the emission spectrum of the flame. In flames the gas temperature and velocity are such that conventional probe methods of determining pressure would disturb the pressure to be measured. The object is to provide improved optical means for measuring gas pressures within flames without inserting a probe into the flame. It is claimed that the difference in wave length of the D line of sodium will vary directly with gas pressure. Making use of this phenomena, a gas mixture may be calibrated for varying pressures at low gases velocities when the pressure within the flame is approximately equal to the pressure of the surroundings. The gas pressure of high velocity streams may then be measured using this calibration.

D. L. Nicol

Wade, F. THE MEASUREMENTS OF HIGH VACUUM BY ELECTRICAL METHODS. PART 2. *Electronic Engineering* 23,, 44-48 (1951) February.

In the second paper in this series the Penning discharge tube gauge is described. An external magnet imposes a special motion on the electrons, increasing the possibility of collision. Pressures to $10^{-5}$ mm may be measured. The ionization gauge is described, for both the major types, i.e., grid negative to anode and grid positive to anode. The "Alphatron" gauge, which employs an alpha particle source has been used from 25 to $10^{-6}$ mm. The Knudsen gauge is also reviewed.

S. Katz

### Temperature Control

Barnes, R. S. A SIMPLE TEMPERATURE-CONTROLLED LABORATORY FURNACE. *J. Sci. Instruments* (British) **28**, 89-92 (1951) March.

A very precise high temperature furnace is described in which the resistance heating element forms two arms of a Wheatstone bridge network which is balanced at a temperature determined only by the other two arms.

S. Katz

### Unsteady-State Analyzer

Patterson, O. L., Montague, K. E. and Weiss, B., Jr. HIGH SPEED ELECTRONIC RESERVOIR ANALYZER. *Oil Gas J.* **49**, 87-89 (1951) April 5.

A high-speed electronic reservoir analyzer of improved accuracy for predicting the unsteady-state behavior of oil reservoirs is described. The analyzer repeats the entire history of reservoir performance cyclically at a rate of 250 times each second. The high repitition rate permits immediate observation and measurement of the effects of adjustments in reservoir parameters or production programs on reservoir performance. The basic electric analogy for a water drive reservoir has been extended to include an analog representing a gas cap.

Authors' abstract

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Fahnestock, F. C. HYDROCARBON CONVERSION AND CATALYST REGENERATION APPARATUS. p. 76

Rogers, W. F. ELECTRICAL RESISTIVITY OF COATINGS. p. 86

## 12. MATERIALS OF CONSTRUCTION

### Coating Materials

Diehlman, G. and Beenfeldt, E. L. PREVENTING CORROSION WITH PROTECTIVE PAINT COATINGS. *Corrosion* **7**, 88-92 (1951) March.

Several factors are discussed which will effect the stability of any paint system. These are: the base metal, the surface preparation and the application of the paint. Tabulated information on the selection and use of red lead base paints includes (a) type of exposure, (b) reference specifications, and (c) suggested paint systems.

B. E. Hunt

Rogers, W. F. ELECTRICAL RESISTIVITY OF COATINGS. *Petroleum Engr.* **23D**, 5-12, 14, 16 (1951) March.

The general theory upon which the measurement of a coating's electrical resistivity is based was discussed. Various pieces of equipment which are required are described. Of the seven methods tested—pattern-resistance method, isolated area test, Pearson method, Scott method, attenuation method, current-voltage change method, and distributed anode method—the author is of the opinion that the current-voltage change method is the most practical for use. The basic assumptions, measurements, and calculations required by each method are discussed.

B. E. Hunt

Scott, J. B. HOW TO PROTECT YOUR STEEL. *Chem. Eng.* **58**, 135-138 (1951) April.

Practical suggestions derived from plant scale tests are given. Preliminary surface preparation, uniform coverage, minimum porosity, and reduced drying time are discussed. The idea is suggested that a frequent application of an inexpensive house paint may be less expensive than infrequent applications of expensive paints.

B. E. Hunt

Shideler, N. T. HOT APPLIED COAL TAR COATINGS. *Petroleum Engr.* **23D**, 5-8, 10 (1951) February.

The requirements for an ideal pipeline coating are itemized. The principal features in the manufacture and utilization of narrow range, moderate range, and wide range coal tar enamels are discussed. The various tests and specifications which have been developed for testing these enamels and their raw materials are discussed.

B. E. Hunt

Shideler, N. T. HOT APPLIED COAL TAR COATINGS. PART 2. *Petroleum Engr.* **23D**, 18, 20, 22, 24 (1951) March.

The significance of laboratory tests on coating materials is discussed. Several factors—primer and primer application, enamels, bonded wrappers, handling coated metals, and flux in coatings—which effect the field life of coatings are discussed.

B. E. Hunt

3500 ZIPCOATS SPEED LAYING OF INDIANAPOLIS UTILITY'S LINE. *Gas* **27**, 36-37 (1951) April.

"Zip coats" are synthetic blankets applied to either welded or coupled joints as corrosion protection. The use of these "zip coats" permits pipe laying to proceed in subzero weather without requiring heated tar kettles and the handling of hot tar.

B. E. Hunt

## Corrosion

Grebstad, E. H. and Gilbert, T. H. HOW CATHODIC PROTECTION WAS APPLIED TO THE UNDERSIDE OF A WATER-SEAL HOLDER. *Gas* **27**, 41-43 (1951) April.

The soil surveys and test procedures employed in testing the soil beneath the gas holder are described. Figures are presented showing the equipotential lines when various drainage currents are drawn out. The final design of the installation is shown.

B. E. Hunt

Parker, M. E. FIELD MEASUREMENTS IN PIPE LINE CORROSION. *Gas Age* **107**, 18-20, 54, 56 (1951) March 29.

Field measurements are usually made for one of the following reasons: (1) to predict corrosive conditions, (2) to determine corrosion rate, (3) to appraise the damage already caused, (4) to obtain design data, and (5) to supervise the operation of a cathodic protection system. Several general types of surveys may be made—preliminary, active corrosion, damage appraisal, design, and supervisory. In all cases of cathodic protection, follow-up tests should be made to ensure that the system is performing efficiently.

B. E. Hunt

Parker, M. E. CORROSION AND ITS CONTROL. PART 8. CATHODIC PROTECTION OF CONDENSERS AND HEAT EXCHANGERS. *Oil Gas J.* **49**, 244.

The application of cathodic protection to condensers and heat exchangers is described. Due to the limited "throwing power" of the anodes very little protection is afforded the tubes themselves.

B. E. Hunt

Tice, E. A. CORROSION PROBLEMS IN THE MODERN BY-PRODUCT COKE PLANT. *Corrosion* **7**, 128 (1951) April.
Additional data are reported of metal specimens tested in ammonia stills and in light-oil acid washing equipment.

B. E. Hunt

JOINT CATHODIC PROTECTION SYSTEMS. *Petroleum Engr.* **23D**, 53-55 (1951) February. This is Bulletin 4 of a series on Cathodic Protection sponsored by the Correlating Committee on Cathodic Protection. The techniques of design and installation, the possible division of responsibility for construction, operation, and maintenance and the sharing of costs are discussed. Also included is an outline of the principal points that might be included in an agreement among the owners of a joint protection system.

B. E. Hunt

## Corrosion Inhibitors

Caldwell, J. A. A NEW INHIBITOR FOR SULFIDE CORROSION. *Petroleum Engr.* **23B**, 58, 61, 62 (1951) March.

A new inhibitor "Corepit" developed by Humble Oil and Refining Company has proven quite successful in halting the corrosion of tubing and sucker-rods in sulfide producing wells.

B. E. Hunt

Caldwell, J. A. INHIBITOR CONTROL FOR SULFIDE CORROSION. *World Oil* **132**, 191, 192 (1951) April.

The use of chemical inhibitors for "down the hole" treatment of wells producing fluids containing $H_2S$ is discussed. Examples of some field results are given.

B. E. Hunt

Frye, C. C., Giezentanner, W. L. and Clement, F. M. CORROSION MITIGATION IN THE NORTH MC CALLUM FIELD. PART 2. *World Oil* **132**, 214, 217, 218, 220 (1951) April.

Field tests of several commercial inhibitors both liquid and stick types are reported. The results indicated that liquid inhibitors are effective and that the use of plaster coated strings permit the reduction of quantity of inhibitor required.

B. E. Hunt

## Heat Resistant Metals

Holmberg, M. E. HIGH TEMPERATURE SERVICE WITH AUSTENITIC STEELS. *Petroleum Processing* **6**, 256-261 (1951) March.

The purpose of this paper is to call attention to certain factors which should be considered in using austenitic steels in high temperature service. In addition to data on high-temperature tensile, creep, and stress properties, information concerning high temperature abrasion resistance, stress relieving, expansion and contraction, "hot shortness," thermal conductivity, thermal shock, and thermal fatigue is quite essential in the design of equipment. In some cases stabilized austenitic steels are not required for gas cracking and still tubes.

B. E. Hunt

RUSSIANS HAVE NEW HEAT-RESISTANT ALLOYS. *Iron Age* **167**, 65-69 (1951) March 22.

This article is an extended abstract of the investigations carried out by Karnilov and coworkers which were published in Russia in 1945. The shortage of nickel and cobalt stimulated the development of ternary iron-chromium-aluminum alloys. As a result of this study 4 alloys were chosen for commercial development. Proper selection of these alloys for use as heating elements permit continuous furnace operation at temperatures up to 2700°F. The carbon content of these alloys must be carefully controlled and must be as small as possible.

B. E. Hunt

## Service Connections

Dye, G. G. SELECTING INSULATING FITTINGS FOR JUNCTURES OF COPPER TO STEEL IN MAINS AND SERVICES. *Gas* **27**, 38-40 (1951) April.

Insulating fittings are installed to separate copper services and mains from steel mains. Several types of couplings, tees, swirls, and bushings which are being tested by the author's company are discussed.

B. E. Hunt

O'Brien, J. E. SERVICE CONNECTIONS FROM CAST IRON MAINS. *Gas Age* **107**, 21, 47, 48 (1951) March 29.

The installation of service connections to mains containing gas under pressure has been a prime source of hazard due to the escaping of gas during the various operations. Several modifications of existing equipment and technique are described. A modified Mueller No-Blow tee has been found to be the most satisfactory device for making service connections without the hazards of escaping gas.

B. E. Hunt

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Godard, H. P. A NEW INSTRUMENT FOR MEASURING GALVANIC CORROSION CURRENTS. p. 85

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